

CLAIMS:

I claim:

1. A planetary gear motor assembly for opening and closing a shutter door on a coin dispensing mechanism, said assembly including an assembled cage having a pair of annular plates with a plurality of stacked pairs of planet gears sandwiched between the pair of annular plates, wherein the improvement comprises:

a plurality of pins on which the pairs of planet gears are stacked, each of the pins being staked at opposite ends to the pair of annular plates so that structural integrity of the assembled cage is retained during rotation of the planet gears.

2. A planetary gear motor assembly according to Claim 1, wherein:
each of the pins at their opposite ends has an indentation therein caused by being staked to the pair of annular plates.

3. A planetary gear motor assembly according to Claim 1, wherein:
each of the pins at their opposite ends is flared at an upper surface of a top one of the pair of annular plates and a lower surface of a bottom one of the pair of annular plates.

4. A planetary gear motor assembly according to Claim 1, wherein:
said plurality of stacked pairs of planet gears is allowed to seek its own natural center by contact between surfaces of adjacent teeth on each of the planet gears.

5. A planetary gear motor assembly according to Claim 1, further comprising:
a sun gear positioned centrally among lower ones of the planet gears.

6. A planetary gear motor assembly for opening and closing a shutter door on a coin dispensing mechanism, said assembly comprising:

a housing having an exterior wall;

an assembled cage placed inside the housing, said cage having a pair of annular plates, a plurality of cluster gears composed of upper and lower planet gears sandwiched between the pair of annular plates, and a plurality of pins on which the cluster gears are placed, each of the pins being staked at opposite ends to the pair of annular plates so that

structural integrity of the assembled cage inside the housing is retained during rotation of the planet gears; and

an output gear mounted over the housing and configured to open and to close the shutter door.

7. A planetary gear motor assembly according to Claim 6, wherein:

each of the pins at their opposite ends has an indentation therein caused by being staked to the pair of annular plates.

8. A planetary gear motor assembly according to Claim 6, wherein:

each of the pins at their opposite ends is flared at an upper surface of a top one of the pair of annular plates and a lower surface of a bottom one of the pair of annular plates.

9. A planetary gear motor assembly according to Claim 6, further comprising:
a hoop ring surrounding the exterior wall of the housing.

10. A planetary gear motor assembly according to Claim 6, wherein:

said plurality of cluster gears is allowed to seek its own natural center by contact between surfaces of adjacent teeth on each of the planet gears.

11. A planetary gear motor assembly according to Claim 6, further comprising:
a sun gear positioned centrally among the lower planet gears.

12. A method of manufacturing a planetary gear motor assembly for opening and closing a shutter door on a coin dispensing mechanism, said method including the step of assembling a cage having a pair of annular plates with a plurality of cluster gears composed of upper and lower planet gears sandwiched between the pair of annular plates, wherein the improvement comprises a step of:

staking a plurality of pins, on which the cluster gears are placed, at opposite ends to the pair of annular plates;

whereby structural integrity of the cage is retained during rotation and abrupt stopping of the planet gears.

13. A method of manufacturing according to Claim 12, wherein:

said staking step causes an indentation to be made in each of the pins at their opposite ends.

14. A method of manufacturing according to Claim 12, wherein:

said staking step causes each of the pins at their opposite ends to flare out at an upper surface of a top one of the pair of annular plates and a lower surface of a bottom one of the pair of annular plates.

15. A method of manufacturing a planetary gear motor assembly for opening and closing a shutter door on a coin dispensing mechanism, said method comprising steps of:
providing a housing with an exterior wall;

placing an assembled cage inside the housing, said cage having a pair of annular plates, a plurality of cluster gears composed of upper and lower planet gears sandwiched between the pair of annular plates, and a plurality of pins on which the cluster gears are placed, each of the pins being staked at opposite ends to the pair of annular plates so that structural integrity of the assembled cage inside the housing is retained during rotation and abrupt stopping of the planet gears; and

mounting on the housing an output gear configured to open and to close the shutter door.

16. A method of manufacturing according to Claim 15, wherein:

each of the pins at their opposite ends has an indentation therein caused by being staked to the pair of annular plates.

17. A method of manufacturing according to Claim 15, wherein:

each of the pins at their opposite ends is flared out over an upper surface of a top one of the pair of annular plates and a lower surface of a bottom one of the pair of annular plates.

18. A method of manufacturing according to Claim 15, further comprising the step of:

surrounding the exterior wall of the housing with a hoop ring.

19. A method of manufacturing according to Claim 15, further comprising the step of:

using a molded ring to align the plurality of cluster gears composed of the upper and lower planet gears inside the housing with the output gear.

20. A method of manufacturing according to Claim 19, further comprising the step of:

removing the molded ring from the plurality of cluster gears by breaking the molded ring at a weakened edge.